

**Arkwood, Inc. Site
Responsiveness Summary**

The written comments received from Mass Merchandisers, Inc. (MMI), a potentially responsible party at this site were extensive and are presented separately from the comments received from all others. The following are questions and comments received during the public comment period and at the Public Meeting held on July 25, 1990, at the Omaha Public School:

1. Comment: The city of Omaha does not feel it is safe, from an emissions standpoint, to incinerate in the valley, and close to the Omaha Public School.

Response: EPA believes that a well designed and properly operated incinerator will not cause health or environmental problems. Based on the best available information concerning the risks of incineration, EPA has developed strict standards that limit the emissions from hazardous waste incinerators. The incinerator will be required to demonstrate that it can meet these standards during a test burn and must meet these standards at all times during the actual incineration. Air monitors will be placed around the site and at the school to ensure that air quality is maintained safely.

2. Question: How long could the incineration and the possibility of emissions exist?

Response: The time required to incinerate the soils is dependent on the capacity of the incineration unit and the amount of materials requiring incineration following the sieve and wash process. Incinerators with a wide range of capacities are available. The Feasibility Study estimated an incinerator feed capacity of 50 cubic yards per day. Based on this feed rate, incineration of all of the contaminated materials (approximately 20,400 cubic yards) would take 400 days. However, adding the sieve and wash process prior to incineration has been estimated to reduce the volume to be incinerated to 7,000 yds³ and reduced the time of incineration (used to estimate costs) to approximately 140 days.

3. Question: The residents of Omaha would rather leave the contamination in place than have it burned and expose the school children and area residents to the emissions. If the problem is in the soil now, why put it into the air?

Response: The risk from a well designed and operated incinerator is much less than the current risk from the site. The threats posed by the contaminants that now exist in the site's soils will not be transferred into the air because all (at least 99.99%) of the contamination will be destroyed or removed from emissions during the incineration process.

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4. Comment: The Feasibility Study states that a remedy involving consolidation and capping of soils from the main site is an "acceptable" alternative and thus should be the selected remedy.

Response: The purpose of the Feasibility Study is to present alternatives for site remediation and to compare them to the nine evaluation criteria. This comparison to the evaluation criteria allows EPA to select a remedy that is properly balanced against the criteria. The Feasibility Study does not provide an assessment of the "acceptability" of any alternative. EPA has reviewed the consolidation and capping alternative and has deemed it inappropriate for this site because it does not provide treatment of site contaminants to the maximum extent practicable as required by the Superfund law, is not as permanent a remedy as the alternative selected, and it does not provide for, long term protection of ground water.

5. Comment: The Feasibility Study states that the consolidation and capping alternative is fully protective of human health and the environment. Therefore it should be the selected remedy.

Response: The Feasibility Study does provide that consolidation and capping meets this criteria. However, when EPA selects a remedy, it evaluates the various alternatives against all nine criteria and selects a remedy that has the proper balance between all the criteria. The capping and consolidation remedy was not selected because it does not provide an acceptable level of long term permanence and protection of the ground water compared to the selected remedy.

6. Comment: At the February Open House, EPA representatives stated that there was "very little chance" of onsite incineration.

Response: The purpose of the February Open House was to discuss the findings of the Remedial Investigation, not to discuss the results of the Feasibility Study, which had yet to be completed. At that time, preliminary review of treatability test results indicated that the sieve and wash and biological treatment technologies might meet EPA remedial requirements. However, further review of the alternative technologies indicated that these treatment technologies, alone, would not be sufficient to destroy site contaminants to acceptable levels. Since the incineration alternative is the only alternative identified in the Feasibility Study capable of destroying the site's contamination to acceptable levels, it was selected as the appropriate remedy.

7. Question: Did EPA consider bioremediation using Flavobacterium and would it be possible to bioremediate during the construction of the incinerator?

Response: Yes, Flavobacterium was added to the indigenous organisms during treatability testing during the Feasibility Study (Feasibility Study Report, Volume II, page 7-1). As mentioned above, the biological treatment alternative did not meet EPA remedial requirements. It would be impractical to design, construct and implement a bioremedial system while constructing the incinerator. The incinerator itself will effectively destroy the contaminants present in the soil and the effort involved with bioremediating the contaminated material first would be counterproductive and unnecessary.

8. Comment: Mass Merchandisers, Inc. (MMI) stated that EPA had, at an earlier meeting between MMI and EPA, agreed that the affected soils should be consolidated and capped.

Response: EPA never made this agreement at an earlier meeting or at any other time. In fact, EPA conveyed to MMI at an earlier meeting that consolidation and capping did not appear to be appropriate and that it would be very unlikely that this alternative would be selected as the site's remedy.

9. Comment: MMI disagrees with EPA's concern that a sinkhole could develop under the capped, contaminated soil, allowing the untreated hazardous materials to migrate into the ground water. They feel that this should not be a reason to reject the consolidation and capping alternative they proposed.

Response: Capping some of the most highly contaminated materials at the site, as preferred by MMI was rejected by EPA because it does not meet the preference for permanent treatment to the maximum extent practicable, as specified by CERCLA. Capping such materials does not provide adequate long term protection. The site investigation indicated that the geology is complex, not well understood, and that sinkholes while not common, could occur below capped materials. This degree of uncertainty stressed the need to comply with the CERCLA preference for permanent treatment.

10. Comment: MMI stated that the levels and types of dioxin at the site do not pose a risk to human health.

Response: EPA disagrees with this assessment. EPA toxicologists have adopted an internationally recognized policy that relates the less toxic forms of dioxin to the most toxic form, using toxicity factors. The dioxin types present on-site are indeed less toxic than the most toxic form, but are present in sufficiently high concentrations to pose a risk to human health.

11. Comment: There is a clear trend in scientific opinion that the risk to human health due to dioxin is overstated.

Response: At present, there is a large amount of discussion in the scientific community, including EPA scientists, regarding the potency of dioxin as a human carcinogen. However, EPA's approach in estimating risks to human health posed by dioxins, and other hazardous substances at the site, is well established and scientifically sound.

12. Comment: MMI believes that every possible alternative should be explored before an incinerator is constructed.

Response: MMI, with EPA oversight, conducted a Feasibility Study to explore a wide range of possible remedial alternatives for this site. MMI also submitted, in writing, a number of additional alternatives they requested EPA evaluate. EPA has evaluated all of the alternatives in both the FS and those submitted by MMI and has selected a remedy it believes will safely and in a cost effective manner, destroy the threats at the site.

13. Question: Since the ground water from New Cricket Spring is showing a decrease in contamination, why is excavation and incineration necessary?

Response: While it is true that New Cricket Spring appears to be showing a slight decrease in contamination, this factor is not a true indication of the threats posed by the site. On-site levels of contamination are sufficiently high to warrant the degree of remedial action selected. The selected remedy will permanently rid the site of contamination above health based levels, and will provide long-term protection to the ground water and surrounding environment.

14. Question: Wouldn't rainfall cause the contamination to spread during the excavation of the soils before incineration?

Response: Runoff from the site during the excavation activities will be collected and treated if necessary to meet NPDES requirements to minimize the possibility of contamination spreading offsite during the remedial action.

15. Question: What are the contaminant levels coming out of New Cricket Spring compared to drinking water standards?

Response: The only contaminant found in New Cricket Spring is pentachlorophenol (PCP). The drinking water standard (expressed as a Maximum Concentration Limit, or MCL) for PCP is 1.01 mg/l. The levels found at New Cricket Spring during the Remedial Investigation were from 1.0 - 2.3 mg/l.

16. Question: After the remediation, what will the site be able to be used for?

Response: The remediation goals were set assuming an industrial use. The site will be able to be used for businesses but not for residential purposes.

17. Question: Because the contamination has been there so long, is it likely that much of the contamination has already degraded or run off the site?

Response: While it is possible that some contamination has run offsite, very little contamination was found offsite during the investigation. Some of the site contamination may have degraded. Regardless, enough contamination remains onsite to warrant the remedial action selected.

18. Question: What type of emission controls are included on the incinerators?

Response: The gasses from combustion in the incinerator are typically treated to remove inorganic acid gasses and particulate matter. Particulate matter can be removed with several devices. One of the oldest methods is baghouse filtration which involves passing the gas through a material that collects the particulate matter. Another method involves electrostatic precipitators. The particulate matter in the gas is electrically charged and collects on plates that are oppositely charged. The particulate matter is then cleaned from the plates. Still another approach is the venturi scrubber. Venturi scrubbers use high pressure water to remove the particulate matter. Hydrogen chloride gasses that result from the incineration of chlorinated compounds (such as PCP and dioxins) are typically removed using other types of scrubber devices, such as packed bed, spray tower, and plate tower scrubbers. These scrubbers bring alkaline water and the combustion gasses together, providing the greatest possible contact between the water and the gasses. This allows the hydrogen chloride gas to dissolve in and be neutralized by the alkaline water.

19. Question: Will the incinerator have an afterburner?

Response: In order to ensure complete combustion of all waste constituents, an afterburner, or any other equivalent devise, is included in all incinerators of hazardous waste.

20. Question: Will my home (the Rose Birmingham residence) be placed on the city water line and who will pay the water bill?

Response: The Birmingham well is included as one of the private wells to be placed on the city water line. Individual homeowners will be responsible for paying the water bills.

21. Question: When will the site be cleaned up?

Response: It will likely be a couple of years before construction of the remedy begins. This time will be used to attempt to negotiate a settlement with the Potentially Responsible Parties (PRPs), and to design the actual remedy. Once the design is complete, remedial construction can begin. Actual site remediation will likely take between two and three years.

22. Question: Will local residents get priority jobs relating to the site's remediation?

Response: If the site work is conducted by the Federal government, then the services required for the work will be procured according to the Federal Acquisition Regulations (FAR). Under the regulation, local businesses are not given a priority over other businesses. Under the regulations, only minority businesses and businesses owned by women are given a priority. However, in the competitive bidding process under FAR, local businesses often have an advantage over others since they are located near the site.

23. Question: Can and/or will hazardous waste from outside the Arkwood site be brought to the site and incinerated? Why not take the contaminated material to the incinerator that has been constructed in Jacksonville, Arkansas?

Response: Because the Jacksonville site is not a permitted commercial disposal facility, waste from the Arkwood site can not be accepted for incineration. In addition federal regulations only allow wastes from one Superfund site to be brought to another if the sites are near one another and the wastes from the sites are similar. Since no other Superfund sites are near the Arkwood site, it is unlikely that wastes from outside the Arkwood site will be incinerated at the site. Because of the same regulations, the Arkwood wastes can not be taken to the incinerator in Jacksonville.

24. Question: Portions of the school playground were backfilled with soils taken from the site. Has, or will, the playground be tested?

Response: At this time EPA does not plan any soil testing at the playground. Further investigation regarding this issue revealed that all soils that were excavated from the site and used as backfill at the playground were taken from an area on the site that was still in its natural, undisturbed state, located approximately 30 feet above the plant site and treated wood storage areas. Consequently, the fill removed from this area would never have been affected by plant operations or rainwater runoff from the plant site.

25. Question: Were there downstream core samples taken from Cricket Creek?

Response: Sediment samples were collected from Cricket Creek 155 feet above and 165 feet below the confluence of Cricket Creek and Cricket Spring Channel. Sediment samples were also collected in Cricket Spring Channel at approximately 600-foot intervals between New Cricket Spring and the confluence of Cricket Spring channel with Cricket Creek. No contamination was detected during this part of the investigation.

26. Question: Were there any offsite samples taken from the railroad tracks?

Response: No samples were taken on the railroad tracks. However, offsite samples taken near the railroad track did not reveal any site-related contamination.

27. Question: Does contamination in New Cricket Spring increase with flow, such as after a rainfall event?

Response: Sampling of the Spring following rainfall showed the contamination to increase slightly at first and then to quickly decrease as the Spring flow increased.

28. Question: Is there an estimate of how much contamination is in the ground below the surface soils and will there be any future studies to determine this?

Response: Results of the remedial investigation show that approximately 20,800 cubic yards of soils exceed the health based cleanup levels. However, the materials are, for the most part, within a couple feet of the ground surface. Some additional contamination may have migrated to greater depths but due to the karst geology, it is not possible to define where and if this has occurred. It should be stressed that the selected remedy will destroy the majority of site contaminants and eliminate the source of contamination,

thereby providing long term protection.

29. Question: Is the original well for the site contaminated?

Response: No. This well was tested six times, and no site related contaminants were found.

30. Comment: Incineration is an unacceptable solution because if the incinerator allows 1 lb. of hazardous material to release into the atmosphere per 10,000 lbs. of material treated then a total of 3,468 lbs. of hazardous materials will be released.

Response: This assumption is factually incorrect. The incinerator will be required to destroy or remove, before emitting any gasses, at least 99.99% of the hazardous substances fed into the incinerator. The commentor is basing his calculation on the incorrect idea that the material to be incinerated is 100% contaminated. Since the feed to the incinerator will contain contamination in the parts per million range, the emissions will be extremely small.

The following are questions and comments received in writing during the public comment period from Mass Merchandisers, Inc.:

1. Comment: Conditions at the Arkwood Site pose no significant risk to human health and the environment.

Response: Both the Endangerment Assessment (EA) and the remedial investigation (RI) demonstrated that the site does pose a risk to the public health and the environment. The EA indicated that the excess lifetime cancer risk from the Main Site for the worst-case residential scenario is approximately one excess cancer case in a thousand individuals (10^{-3}), using outdated Toxicity Equivalency Factors (TEFs) and four excess cancer cases in a thousand individuals (4×10^{-3}), using the new TEFs. These risk levels exceed the EPA acceptable risk range established in the National Contingency Plan of one excess cancer case in ten thousand individuals (10^{-4}) to one excess cancer case in a million individuals (10^{-6}). The revised calculations using the new TEFs for the most probable future land use resulted in a calculated risk of approximately one excess cancer case in ten thousand individuals (10^{-4}). This risk level is at the upper end of the EPA acceptable risk range. The calculations, using the new TEFs, for the Railroad Ditch for the most probable land use conditions are the maximum future land use conditions (an increased frequency of exposure to the ditch by children), result in a calculated

risk of one excess cancer case in ten thousand individuals (10^{-4}) and two excess cancer cases in ten thousand individuals (2×10^{-4}), respectively. These risk levels are at the upper end, and above the EPA acceptable risk range. Furthermore, the RI demonstrated that the site contained 2,3,7,8 TCDD equivalents above the accepted levels for industrial uses, and far beyond that for any residential use. The RI also demonstrated that the site had contaminated area groundwater above the maximum contaminant levels (MCL).

2. Comment: The new TEF's have not undergone formal adoption through Agency rulemaking or any comparable legal process.

Response: EPA is under no obligation to establish policies through a formal rulemaking process. The concept of using TEFs for chlorinated dibenzo-p-dioxins and -dibenzofurans was peer reviewed and recommended by two Agency wide groups, the Risk Assessment Forum and the Science Advisory Board. The new TEFs (1989 Update) were peer reviewed by the Risk Assessment Forum and were specified for use by a memorandum from F. Henry Habicht II (Deputy Administrator, EPA), Chair, Risk Assessment Council, to the EPA Assistant and Regional Administrators (March 21, 1990).

3. Comment: MMI indicated that the EPA recalculations of the Toxicity Equivalency Factors (TEFs) for dioxins and dibenzofurans were not consistent with the Endangerment Assessment (EA).

Response: The EPA calculations using the new TEFs were done in a manner consistent with both the EA and EPA policy. Both the EA and the EPA "calculations" used the geometric mean of the dioxin and dibenzofuran concentrations.

4. Comment: The EPA made the unilateral decision to recalculate the risk estimate using new TEF values without notifying MMI.

Response: EPA is under no obligation (legally or otherwise) to inform or consult with MMI or any other PRP before making any risk calculations. A memorandum from F. Henry Habicht II to the Assistant and Regional Administrators (March 21, 1990) specified the use of the new TEFs.

5. Comment: The EPA disregarded site specific conditions when proposing the dioxin cleanup levels of 20 ppb.

Response: EPA evaluated the possible future uses of the site in selecting its cleanup goals. This evaluation concluded that while the site is currently unused, it could be used for industrial purposes. Based upon this possible use, EPA selected the 20 ppb cleanup goal, which is the accepted

cleanup goal for industrial uses as established by the Agency for Toxic Substances and Disease Registry.

6. Comment: The proposed plan is incorrect in its statement that the majority of the site risk is from dioxins and dibenzofurans.

Response: The Endangerment Assessment indicated that the majority of the excess cancer risk from the railroad ditch and main site is attributed to dioxins and dibenzofurans. EPA calculations using the new TEFs further increased the risk due to the dioxins and dibenzofurans.

7. Comment: MMI contends that classification of dioxin as a probable cancer causing agent is unsubstantiated.

Response: The EPA wide Carcinogenic Risk Assessment Verification Endeavor (CRAVE) Workgroup classifies dioxin as a group B2, probable human carcinogen. Classifications verified by CRAVE Workgroup have undergone extensive peer review and represent an Agency consensus.

8. Comment: In the submission of Appendix A (Evaluation of the 1989 Endangerment Assessment for Arkwood), MMI contends that the dioxin-related risks at the main site and railroad ditch are on the order of 10^{-8} or lower.

Response: MMI contracted with a firm to critique the 1989 Endangerment Assessment which was performed by MMI, with EPA oversight. The critique attacks the Endangerment Assessment for having used calculations and assumptions that are consistent with EPA policies and guidance, and advocates the use of calculations and assumptions that are contrary to EPA policies and guidance. These result in calculated risks many orders of magnitude below those calculated by MMI in the Endangerment Assessment.

EPA Endangerment Assessment policies and guidance that were developed to implement the National Contingency Plan, were subjected to cross-program peer review. The paragraphs below discuss the most important assumptions and calculations advocated in the critique, but that are contrary to EPA policies and guidance.

In Appendix A, Section 3 of the critique (Selection of Indicator Chemicals), octachlorinated dibenzo-p-dioxin (OCDD) and other compounds of concern, such as carcinogenic PNAs are not included as part of the carcinogenic risk at the site. The omission of these compounds in the risk calculations results in a significant understatement site risks. According to EPA policy and guidance, and the Arkwood EA, the compounds should be included in the risk calculations.

A cancer potency factor for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of $9,700 \text{ (mg/kg-day)}^{-1}$ is presented in Appendix A, Section 5 of the critique (Dose Response Assessment). This cancer potency factor or slope factor has not been verified by the CRAVE workgroup and is not in accordance with EPA policy. The EPA slope factor for 2,3,7,8-TCDD is $1.56 \times 10^5 \text{ (mg/kg-day)}^{-1}$.

Several exposure parameters used in Appendix A, Section 6 (Exposure Assessment) are not in accordance with EPA guidance. The MMI submission used soil ingestion rates of 5 mg/day for older children and adults; whereas, EPA guidance (OSWER Directive 9850.4) recommends soil ingestion rates of 100 mg/day for older children and adults. The MMI submission used a soil adherence factor of 0.5 mg/cm^2 , which underestimates by a factor of 3 to 6 the quantity of soil adhering to the skin.

In Appendix A, Section 7 (Calculation of Exposure Point Concentrations), the arithmetic mean is used as representative contaminant concentrations. The Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual states that actions at Superfund site should be based on the reasonable maximum exposure (RME). Because of the uncertainty associated with sampling, the 95 percent upper confident limit on the arithmetic average is now being used by EPA as a conservative estimate of the exposure concentration contacted over time. Use of the 95 percent upper confidence limit was not used by MMI at the time the EA was completed, and thus was not used in the EA. However, if the EA were to be conducted today, the 95 percent upper limit would likely be used and the calculated risks at the site would increase.

As a result of the assumptions used in the critique, the MMI submission calculates the potential dioxin risks at the site on the order of one excess cancer case in 100 million individuals (10^{-8}). In contrast, the Endangerment Assessment and the subsequent EPA calculations, which were conducted in accordance with EPA guidance, indicate that MMI submission underestimates site risks by a factor of approximately 10,000.

9. Comment: MMI contends that there is no scientific basis of the Toxicity Equivalency Factors (TEFs) for octachlorinated dibenzo-p-dioxins (OCDD).

Response: In the new TEF approach, OCDD was assigned TEF value of 0.001. This value was based on a recent study by Couture et al. (1988) in which male rats were exposed to low levels of OCDD for 13 weeks. At the end of the study, the animals exhibited signs of toxicity reminiscent of "dioxin toxicity." Based on these results, a TEF value of 0.001 has been assigned to OCDD in the new TEF approach. The new TEFs

were peer reviewed by the Risk Assessment Forum and were specified for use by a memorandum from F. Henry Habicht II to the Assistant and Regional Administrators (March 21, 1990).

10. Comment: In the submission of Appendix E, MMI suggests that 50 ppm of carcinogenic polycyclic aromatic hydrocarbons (PAHs) would be associated with a 10^{-6} excess cancer risk under the most probable future land use conditions at the Arkwood site.

Response: Several exposure parameters used in Appendix E, Section 2 (Exposure Assessment) are not in accordance with EPA guidance. The MMI submission used soil ingestion rates of 25 mg/day for children aged 0 to 6 years, and 5 mg/day for older children and adults; whereas, EPA guidance (OSWER Directive 9850.4) recommends soil ingestion rates of 200 mg/day for children aged 1 to 6 years, and 100 mg/day for older children and adults. The MMI submission used a soil adherence factor of 0.5 mg/cm², which underestimates by a factor of 3 to 6 the quantity of soil adhering to the skin. These inconsistencies and others suggest that 50 ppm of carcinogenic PAH is not an acceptable remediation goal. In addition, MMI used the draft document "Guidance for Establishing Target Cleanup Levels for Soils at Hazardous Waste Sites" (1988) in calculating their remediation goal. This guidance has not been formally released by EPA and does not represent Agency policy.

11. Comment: The results of the Treatability Study clearly indicate that sieve and wash is a cost-effective means of reducing the volume of contaminants to be dealt with. Sieve and wash should be included as a pre-treatment step before any treatment remedy that might be selected at the Arkwood site.

Response: Sieve and wash has been added to the selected remedy.

12. Comment: MMI opposes the incineration of all affected material at the Arkwood, Inc. site as presented in the Proposed Plan of Action. MMI proposed that any selected alternative include "sieve and wash" as part of the remedy.

Response: The remedy in the ROD includes sieve and wash as part of the remedial action. Therefore, the selected remedy does not include incineration of the entire mass of contaminated material.

13. Comment: The water line that is being installed eliminates any risk due to possible future contamination of nearby domestic wells.

Response: The Superfund law (the Comprehensive Environmental Response, Compensation and Liability Act, CERCLA), and the National Contingency Plan (NCP) specify a strong preference for the permanent treatment of hazardous substances that pose a threat to human health and the environment. Installing water lines, in lieu of treatment, does not satisfy this preference. In addition, Section 300.430 of the NCP states that institutional controls shall not be used as a substitute for treatment. Therefore, MMI's argument is contrary to the goals of the Superfund law and regulations.

14. Comment: MMI submits that further study is warranted in this case due to the unexpected concern about dioxin and catastrophic sinkhole development expressed after completion and approval of the Remedial Investigation and Feasibility Study Reports.

Response: Further study is not warranted. The RI characterized site contamination and the Feasibility Study evaluated a wide range of alternatives that enabled EPA to select a cost-effective, implementable alternative that will meet the CERCLA preference for permanence through treatment. Both the RI and FS reports discuss the uncertainty and complexity of the site geology. Throughout the RI and FS reports, concerns regarding the sinkhole and karst geology are repeated. In addition, the Endangerment Assessment identified dioxin as being responsible for the majority of the site's risk.

15. Comment: MMI contends that EPA has suggested that incineration is the only acceptable remedial alternative for soils containing greater than 20 ppb. However, EPA has selected containment of such soils at three sites: the Diamond-Alkali, Selma Pressure Treating Co., and Broderick Wood Products sites.

Response: While the RODs for these sites did include containment as part of the selected remedy, at two of these sites, Diamond-Alkali and Broderick Wood Products, containment is considered only an interim measure. At the Diamond-Alkali site the soils are being capped onsite, and the ROD requires that a feasibility study be performed every two years until a final remedy is selected. At the Broderick Wood Products site, the majority of the site contamination is K001 waste (wood-treating waste) and is being incinerated onsite. The remainder of the site contamination is being placed into a temporary storage

facility for further evaluation prior to the selection of the final remedy if the volume is more than 2,500 yds³; if it is less, it will be incinerated onsite along with the other site waste.

The Selma Pressure Treating remedy required solidification and capping of wastes that were contaminated by heavy metals and dioxin. However this remedy is not considered to be appropriate for comparison with the Arkwood site since the Selma remediation was driven by heavy metals contamination which would have required solidification even in the absence of dioxin contamination.

16. Comment: EPA's concerns relative to catastrophic sinkhole failure are not consistent with the accumulated knowledge regarding the geology of the Arkwood site and vicinity.

Response: The potential for sinkhole formation is not the predominant reason why EPA rejected the capping of high concentrations of hazardous substances, as preferred by MMI. Sinkhole formation is, however, a consideration. The CERCLA preference for remedies that permanently treat wastes to the maximum extent practicable is the main reason why EPA rejects capping the majority of the site waste. The knowledge gained during the RI indicates that the area geology is too complex to define, that ground water migration pathways are unknown, and will remain so, and that the possibility of sinkhole formation does exist. This possibility, although low, underscores the need to comply with the CERCLA preference for permanent treatment.

17. Comment: MMI contends that Alternative D (Incinerate Sludges/Cap in Place Affected Soils) is an appropriate remedy for the Arkwood, Inc. site. Based upon the investigations of the area's geology, the potential for sinkhole development is so low as to not be considered reasonable. Furthermore, consolidate and cap-in-place has been selected as the remedy at a similar site within Region 6, at the Mid-South Wood site.

Response: See response to comment number 16 regarding sinkholes. In addition, the remedy selected in 1986 at the Mid-South site was done so under the requirements of CERCLA, prior to the reauthorization of CERCLA. When CERCLA was reauthorized, it was amended to include a strong preference for permanently treating wastes to the maximum extent practicable. Alternative D does not

satisfy this preference. While the Mid-South ROD was signed after the reauthorization of CERCLA, a provision was made to allow those remedies developed just prior to the reauthorization of CERCLA, to be selected according to the requirements of CERCLA.

18. Comment: Alternative D, Incinerate Sludges/Consolidate and Cap Affected Soils, fully satisfies all significant remedial concerns.

Response: Alternative D does not adequately satisfy all of the nine criteria for evaluating remedies. It does not adequately satisfy the criteria of permanence and long-term effectiveness because high concentrations of hazardous substances would remain untreated and pose a long-term threat. In addition, Alternative D does not include treatment to the maximum extent practicable, as preferred by CERCLA.

19. Comment: MMI contends that a refinement of Alternative D, "D+2" (Incinerate Sludges/Consolidate and Stabilize Soils/Cap-In-Place Affected Soil and Provide Stormwater Controls) will address the concerns that exist for Alternative D. This will be done through soil stabilization/solidification to immobilize the dioxins and render the soils into a non-flowable mass and through surface water drainage controls to preclude the formation of sinkholes under the consolidated mass of affected soils.

Response: Alternative "D+2" is unacceptable because it does not meet the CERCLA preference for permanent treatment of hazardous substances to the maximum extent practicable. This alternative would leave high concentrations of waste in place, and thus, would not provide for long-term protection of public health and the environment. In addition, treatability tests conducted during the feasibility study indicated that stabilizing the Arkwood soils actually increased the mobility of the PCP. Since the site has already contaminated ground water with PCP, this remedy is unacceptable.

20. Comment: EPA rejected a more cost effective remedy for the Arkwood site, i.e., biological treatment followed by solidification, that was recently proposed at another wood treatment site in Region 6. Effective treatment of the dioxin could be achieved by stabilization after biological treatment.

Response: First, the selected remedy for the Arkwood site is sieve and wash followed by incineration. Cost

estimates by MMI indicate that this remedy has a cost of approximately \$10.3 million. MMI estimated the cost of the biological treatment remedy, without solidification, in the FS at approximately \$14 million. However, during a meeting between MMI and EPA, MMI stated that the FS probably overstated the biological reaction time required in this alternative and instead of the 56 days assumed as necessary in the FS, 14 days may be enough reaction time. MMI did not provide EPA with a revised cost estimate for the shorter reaction time, but estimates by EPA and it's oversight contractor indicate the sieve and wash, biological treatment, and solidification remedy would still cost over \$9 million. The selected remedy for a relatively modest cost increase provides for more permanent and complete destruction of the site contaminants.

Second, the other Region 6 site referred to is the Texarkana Wood site. At the Texarkana Wood site, EPA proposed two possible remedies: An incineration remedy; and a biological treatment remedy. The remedy selected was the incineration remedy because it provided for more complete destruction of the site hazardous substances.

21. Comment: MMI requests that the agency defer final remedy selection and allow MMI to conduct a focused Feasibility Study of a remedy based upon sieve and wash plus in situ vitrification (ISV).

Response: MMI conducted the RI/FS and could have considered ISV as an alternative. MMI has noted , however, that when it was conducting the RI/FS, ISV was found to not be commercially practicable alternative. Even today, ISV is, compared to incineration, in its infancy as a remedial alternative. EPA has weighed the benefits of delaying remedy selection to conduct a focused feasibility study, versus the benefits of selecting a remedy now, and has determined that little benefit would be gained by conducting a focused feasibility study. Therefore, EPA has selected a sieve and wash, followed by incineration, remedy. The only benefit to be gained by conducting a focused feasibility study is that the study might show that in-situ vitrification could work and that it could be selected as a remedy. However, this would result in a significant delay in site remediation with nothing gained in the protection of human health and the environment. ISV has yet to be implemented on a large scale for the destruction of organics. Enough treatability testing has not been conducted to eliminate the unknowns and uncertainties that exist

regarding its ability to effectively and safely destroy dioxins and other organics similar to the contaminants found at the Arkwood site. Major concerns regarding ISV that would apply at the Arkwood site include the possible lateral migration of vaporized organics into adjacent soils and the effectiveness of off-gas collection and treatment. Because of the unknowns and uncertainties, a focused FS would require extensive treatability testing for this site. Recent EPA experience at the Northwest Transformer site, in Everson, Washington, has shown that such extensive treatability testing could take more than a year and cost hundreds of thousands of dollars. In addition, the results from a similar FS at the Arkwood site may not yield sufficient information on which to base a decision to implement ISV, but instead, only indicate a need to increase the scale of testing.

If ISV was successfully tested and selected as the remedy, nothing would be gained in protecting the public health and the environment by selecting ISV because incineration has been demonstrated numerous times to safely and effectively destroy organics such as those found at the Arkwood site. Past incineration projects have shown that emissions can be safely controlled. Effective ISV emissions control, that would be necessary at the Arkwood site, have not been proven to work on a large scale. Furthermore, cost estimates from MMI indicate that the cost of incineration (approximately \$10.3 million) will be comparable or lower than that for ISV (approximately \$11.8 million). Since ISV has never been used on a large scale, cost overruns are very likely. In contrast, past experience with incineration enables far more reliable cost estimates to be made. Therefore, incineration may also be more cost-effective than ISV.

22. Comment: MMI contends that Alternative H (Incinerate Sludges and Affected Soils On-site) is critically defective in two of the "primary balancing criteria" used to weigh major trade-offs among feasible alternatives -- implementability, because incineration is complex to implement, and cost-effectiveness. MMI also contends that this alternative lacks community acceptance.

Response: The selected remedy (sieve and wash, followed by incineration) is both implementable and cost effective. It does, however, appear to lack community acceptance. Incineration of contaminated soils is a proven remedial alternative. While it is a technically complex procedure, it has been successfully

and safely implemented at numerous other locations. Past experience has shown that materials handling of the feed to incinerators is the most difficult implementation problem. However, the sieve and wash process will greatly reduce materials handling problems by reducing the volume to be incinerated and by creating a very uniform media to be incinerated.

Sieve and wash with incineration was estimated by MMI to cost \$10,300,000. Sieve and wash with biological treatment was estimated by MMI, in the FS, to cost approximately \$14,000,000 (without including the cost for solidification). However, as discussed earlier in the Responsiveness summary, MMI has indicated that the reaction time required for biological treatment may be shorter than assessed in the FS and therefore, costs may be lower. EPA and its contractor have estimated that a sieve and wash, biological treatment (with shorter reaction times), and solidification remedy will still cost over \$10 million. Since there is a substantial benefit gained with the degree of destruction achieved by incineration, compared to the partial destruction (and no destruction of dioxins) achieved with biological treatment, incineration is cost effective compared to biological treatment. Regarding the inadequacies of capping remedies, see responses to comments #17, 18, and 19. Given the previously discussed inadequacies of capping remedies, the selected remedy is obviously cost effective.

Regarding community acceptance, EPA believes that by adding the sieve and wash process and thereby reducing the volume to be incinerated and the time required for incineration, the selected remedy will gain public acceptance. EPA also believes that as the community learns more about the safety and capabilities of modern incinerators that it will further accept the incineration remedy.

23. Comment: MMI commented that the Administrative Record was incomplete and should include a number of documents.

Response: The listing of the documents to be included were broken into three separate categories. The response is therefore also broken into these three categories.

Miscellaneous Matters

Documents numbered 1, 3, 6, 8, 9, 12-16, 19-23, 26, 27, 29, and 32-34, have been reviewed and placed into the

Administrative Record for the site.

Documents numbered 2, 4, 5, 7, 10, 11, 17, 18, 24, 25, 28, 30, and 31 are not included because they consist of either comments to draft documents, or responses to comments regarding draft documents. EPA policy is not to include draft documents in the Administrative Record, because they do not reflect final agency position with regard to the selection of remedy.

Documents Dealing Specifically With Project Schedule

The documents regarding the schedule are not relevant to EPA's selection of remedy, and are, therefore, not included in the Administrative Record.

Draft or Final Reports and Plans

Draft documents and any redline versions submitted by a PRP or their contractor do not reflect final Agency position with regard to the selection of remedy and, therefore, are not included in the Administrative Record. Documents numbered 1,2,4-8,10-15, and 18 are draft or redline and are not included. Document number 9 is final and will be included in the final Administrative Record. Documents number 3, and 16 are included in the Administrative Record, but were not included in the index. Document number 17 is included on in the Record as index document number 7997-8201, dated 5/23/90.

The following persons asked questions or made comments during the public comment period at Arkwood:

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